

Preparation of maleic anhydride

Abstract

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Process for preparing maleic anhydride by heterogeneously catalyzed gas-phase oxidation of hydrocarbons having at least four carbon atoms by means of oxygen-containing gases at from 350 to 500°C in the presence of a volatile phosphorus compound over a vanadium-, phosphorus- and oxygen-containing catalyst in a shell-and-tube reactor unit having at least one reaction zone cooled by means of a heat transfer medium, in which the temperature and/or the amount of the heat transfer medium flowing into the first (relative to the feed direction) reaction zone are set so that the mean temperature of the heat transfer medium in the first reaction zone $T_{SB}(1^{st} \text{ zone})$, which is calculated as the mean of the inflow temperature and the outflow temperature of the heat transfer medium, is in accordance with the formulae (I) and (II)

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$$T_{SB}(1^{st} \text{ zone}) \leq T_R(1^{st} \text{ zone}) - T_{\text{safety}}(1^{st} \text{ zone}) \quad (\text{I})$$

$$T_{SB, Y_{\max}}(1^{st} \text{ zone}) - T_A(1^{st} \text{ zone}) \leq T_{SB}(1^{st} \text{ zone}) \leq T_{SB, Y_{\max}}(1^{st} \text{ zone}) + T_B(1^{st} \text{ zone}) \quad (\text{II}),$$

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where

$T_R(1^{st} \text{ zone})$ is the runaway temperature of the first reaction zone;

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$T_{\text{safety}}(1^{st} \text{ zone})$ is the safety temperature of the first reaction zone and has a value of 1°C;

$T_{SB, Y_{\max}}(1^{st} \text{ zone})$ is the mean temperature of the heat transfer medium in the first reaction zone at which the maximum maleic anhydride yield is achieved in the range $T_{SB}(1^{st} \text{ zone}) \leq T_R(1^{st} \text{ zone})$;

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$T_A(1^{st} \text{ zone})$ is 20°C; and

$T_B(1^{st} \text{ zone})$ is 10°C.

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